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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/526,425	03/03/2005	Tsuneko Okazaki	80161(302730)	9673
21874 7590 08/14/2008 EDWARDS ANGELL PALMER & DODGE LLP P.O. BOX 55874 BOSTON, MA 02205				
EXAMINER				
HILL, KEVIN KAI				
ART UNIT		PAPER NUMBER		
1633				
MAIL DATE		DELIVERY MODE		
08/14/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/526,425

Applicant(s)

OKAZAKI ET AL.

Examiner

KEVIN K. HILL

Art Unit

1633

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 May 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4-7, 13 and 14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4-7, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-850)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date May 21, 2008 and June 27, 2008

Detailed Action
Election/Restrictions

Applicant's response to the Requirement for Restriction, filed on October 1, 2007 is acknowledged.

Applicant has elected with traverse the invention of Group I, claim(s) 1, 3-7 and 13-14, drawn to a method of producing a circular mammalian artificial chromosome.

Within Group I, Applicant has elected the insertion sequence species "lox P site", as recited in Claim 13.

Amendments

Applicant's response and amendments, filed May 21, 2008, to the prior Office Action is acknowledged. Applicant has cancelled Claims 2-3, 8-12 and 15-56, and amended Claims 1, 5 and 6.

Claims 1, 4-7 and 13-14 are under consideration.

Priority

This application is a 371 of PCT/JP03/11134, filed September 1, 2003. Acknowledgment is made of Applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). Certified copies of the foreign patent applications Japan 2002-258114, filed September 3, 2002 and Japan 2002, filed November 22, 2002 are filed with the instant application. Certified English translations of said foreign applications have not been provided.

Information Disclosure Statement

Applicant has filed Information Disclosure Statements on May 21, 2008 and June 27, 2008. The Examiner was able to consider the remaining citations to the extent of time allowable. The signed and initialed PTO Forms 1449 are mailed with this action.

CB and CC of the IDS filed June 27, 2008 are lined through for being duplicates of CF and CG filed May 21, 2008, respectively.

The information disclosure statement filed May 21, 2008 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. In particular,

English translations of citations CA, CB and CC have not been provided. They have been placed in the application file, but the information referred to therein has not been considered.

Examiner's Note

Unless otherwise indicated, previous objections/rejections that have been rendered moot in view of the amendment will not be reiterated. The arguments in the May 21, 2008 response will be addressed to the extent that they apply to current rejection(s).

Claim Objections

1. **The prior objection to Claim 3 is withdrawn** in light of Applicant's cancellation of the claim drawn to non-elected subject matter.
2. **Claim 1 is objected to because of the following informalities:** the subject "into a mammalian host cell" (line 6) should be placed closer to its verb of the method step "of introducing" (line 3), as in "a first step of introducing into a mammalian host cell a first vector...". See also "introducing a second vector".

The word "fist" (line 6) is missing the letter "r".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the Applicant regards as his invention.

3. **Claim 1 stands rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

This rejection is maintained for reasons of record in the office action mailed January 22, 2008 and re-stated below. The rejection has been re-worded slightly based upon Applicant's amendment filed May 21, 2008.

With respect to claim 1, the claim recites the limitation "the selection marker gene" (line 13) in reference to the selection step (line 12). There is insufficient antecedent basis for this limitation in the claim. The specification discloses that the second vector may also comprise a

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selection marker gene (pg 16, lines 33-34), and thus it is unclear if “the selection method step is carried out by using the selection marker gene” of the first vector or the second vector.

The Examiner respectfully suggests amending the phrase “the selection marker gene” (line 13) to include “of the first or second vector” to improve the clarity of the inventive method.

Appropriate correction is required.

4. **The prior rejection of Claims 1, 3-7 and 13-14 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement of an insulator sequence is ~~withdrawn~~** in light of Applicant’s amendment to Claim 1 to recite a Markush group of specific insulator sequences.

5. **The prior rejection of Claims 1, 3-7 and 13-14 under 35 U.S.C. 112, first paragraph, is ~~withdrawn~~** in light of Applicant’s amendment to Claim 1 to recite a Markush group of specific insulator sequences.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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6. **Claims 1, 4-6 and 13 stand rejected under 35 U.S.C. 103(a)** as being unpatentable over Mejia et al (Genomics 70(2):165-170, 2000; *of record in IDS, AE), in further view of Waye et al (Mol. and Cell. Biol. 6(9):3156-3165, 1986), Ikano et al (Human Mol. Gen. 3(8):1245-1257, 1994; *of record in IDS, CE) and Perkins et al (US 2003/0119104 A1).

This rejection is maintained for reasons of record in the office action mailed January 22, 2008 and re-stated below. The rejection has been re-worded slightly based upon Applicant's amendment filed May 21, 2008.

Determining the scope and contents of the prior art.

Mejia et al teach a method of making mammalian artificial chromosomes, the method comprising a step of introducing into a prokaryotic host cell a first vector being circular in form and comprising a mammalian centromere sequence, and a second vector being in circular form and comprising an insertion sequence for specifically inserting a sequence of interest. The method further comprises a step of selecting the transformed cells and selecting a cell containing a mammalian artificial chromosome from the selected transformed cells (pg 167, Figure 2). The first vector comprises a selection marker gene, specifically chloramphenicol-resistance (pg 167, Figures 1 and 2), wherein the selection step for the transformed cells is carried out by using the chloramphenicol-resistance marker gene. The mammalian centromere sequence comprises 220kb of α satellite DNA from the human chromosome 17 centromere (pg 165, col. 1, ¶1). The insertion sequence is a loxP recombination site (pg 166, col. 1, ¶2).

Mejia et al do not teach the method being performed in mammalian cells, nor that the vector comprises an insulator sequence. However, at the time of the invention, Perkins et al disclosed a method of producing artificial chromosomes in eukaryotic cells (pgs 6-7, [0074]; pg 14, [0155]-pg 15, [0168]) comprising the use of recombinase enzymes (pg 4, [0051-56]; pg 13, [0145-149]), where the desired nucleic acids are co-transfected into a eukaryotic host cell (pg 14, [0161]). Insulator sequences may be introduced into the artificial chromosome to assist in the expression of the desired transgene or genomic locus, e.g. the β -globin HS4 insulator element (pg 17, [0192]-pg 18, [0196]). Eukaryotic host cells containing the artificial chromosome were selected via assays such as fluorescent in situ hybridization (FISH) (pg 28, Example 2, [0320]).

Neither Mejia et al nor Perkins et al teach the α satellite DNA from the human chromosome 17 centromere to comprise the sequence of SEQ ID NO:1, nor wherein the centromere sequence comprises an 11-mer repeat unit obtained from human chromosome 21. However, at the time of the invention, α satellite (alphoid) DNA was known in the prior art to form a functional centromere in a human artificial chromosome, wherein the presence of a centromere protein B sequence (CENP-B box) in the alphoid DNA is a requirement for the functional centromere. Waye et al taught the sequence of the human chromosome 17 centromere (pg 3159, Figure 3) comprising nucleic acid sequences 100% identical to SEQ ID NO:1. Furthermore, Ikano et al taught a consensus CENP-B box nucleotide sequence from human chromosome 21 alphoid repeats (pg 1250, Table 1), wherein the human chromosome 17 centromere comprises an 11-mer repeat with 100% identity to the consensus sequence set forth by Ikano et al (Waye et al; pg 3159, Figure 3, e.g., the first 20 nucleotides of monomer 10). Thus, while the human chromosome 17 centromere comprising an 11-mer repeat with 100%

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identity to the consensus sequence set forth by Ikeno et al of the consensus CENP-B box nucleotide sequence from human chromosome 21 alphoid repeats is an endogenous sequence, is not "derived from human chromosome 21" as claimed, the 11-mer repeat fulfills the structural identity of the claim, and thus necessarily fulfills the functional requirement of the centromeric feature of the invention. Neither the claims nor the specification disclose an essential feature of the 11-mer repeat that is present when "derived from human chromosome 21" that would not be present in the context of human chromosome 17.

Absent evidence to the contrary, nothing non-obvious is seen with substituting a mammalian centromere sequence comprising an 11mer repeat unit obtained from human chromosome 17 with a mammalian centromere sequence comprising an 11mer repeat unit obtained from human chromosome 21 because both such centromere sequences comprise an 11-mer repeat with 100% identity to the consensus sequence set forth by Ikeno et al of the consensus CENP-B box nucleotide sequence, and thus are considered functional equivalents. An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982). See MPEP 2144.06

Resolving the level of ordinary skill in the pertinent art.

People of the ordinary skill in the art will be highly educated individuals, possessing advanced degrees, including M.D.'s and Ph.D.'s. They will be medical doctors, scientists, or engineers. Thus, these people most likely will be knowledgeable and well-read in the relevant literature and have the practical experience in molecular biology, recombination cloning, making artificial chromosomes, creating transgenic cells. Therefore, the level of ordinary skill in this art is high.

Considering objective evidence present in the application indicating obviousness or nonobviousness.

It would have been obvious to one of ordinary skill in the art to substitute the prokaryotic cells as taught by Mejia et al with mammalian cells as taught by Perkins et al with a reasonable chance of success because the simple substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. At the time of the invention, the ordinary artisan was well-aware that recombination cloning could be practiced in mammalian cells, and had the means to identify and select the mammalian cell containing the desired artificial chromosome. An artisan would be motivated to substitute the prokaryotic cells for mammalian cells because protocols for isolating large mammalian DNA chromosomes *in vitro* or from an *E. coli* host cell lysate is cumbersome, subject to significant DNA degradation, and results in quantitatively poor yields; whereas, *in vivo* recombination is efficient and obviates the need to purify recombination products prior to transduction into the mammalian host cell.

It also would have been obvious to one of ordinary skill in the art to include an insulator element in the mammalian artificial chromosome with a reasonable chance of success because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. An artisan would be motivated to combine an insulator element with artificial chromosomes because these sequences help to define boundaries in chromatin structure and thus minimize influence of chromatin position effect variegation and gene silencing on the expression of the target gene.

Thus, the invention as a whole is *prima facie* obvious.

Response to Arguments

Applicant argues that Mejia et al fails to teach or suggest all the elements of the instant invention.

Applicant's argument(s) has been fully considered, but is not persuasive. In response to Applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, Mejia et al teach a method of making mammalian artificial chromosomes, the method comprising a step of introducing into a prokaryotic host cell a first vector being circular in form and comprising a mammalian centromere sequence, and a second vector being in circular form and comprising an insertion sequence for specifically inserting a sequence of interest. While Mejia et al do not teach the method being performed in mammalian cells, nor that the vector comprises an insulator sequence, this deficiency is made up for by Perkins et al who disclosed a method of producing artificial chromosomes in eukaryotic cells comprising the use of recombinase enzymes, wherein insulator sequences may be introduced into the artificial chromosome to assist in the expression of the desired transgene or genomic locus, e.g. the β -globin HS4 insulator element. Thus, the combination of the cited references renders the instantly claimed invention as a whole *prima facie* obvious.

7. **Claims 1 and 7 stand rejected under 35 U.S.C. 103(a)** as being unpatentable over Mejia et al (Genomics 70(2):165-170, 2000; *of record in IDS, AE), in further view of Wayne et al (Mol. and Cell. Biol. 6(9):3156-3165, 1986), Ikeno et al (Human Mol. Gen. 3(8):1245-1257,

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1994; *of record in IDS, CE) and Perkins et al (US 2003/0119104 A1), as applied to claims 1, 4-6 and 13 above, and in further view of Bokkelen et al (U.S. Patent No. 5,695,967).

Determining the scope and contents of the prior art.

The prior cited art does not teach the mammalian centromere sequence to be about 50kb or less. However, at the time of the invention, Bokkelen et al disclosed a means of cloning iterations of mammalian centromeric alphoid DNA 2.7kb higher order repeats, e.g. 2.7kb, 5.4kb, 11kb, 22kb, 43kb, 86kb, 130kb and 174kb iterations (Figure 1; col. 6, lines 22-25).

Resolving the level of ordinary skill in the pertinent art.

People of the ordinary skill in the art will be highly educated individuals, possessing advanced degrees, including M.D.'s and Ph.D.'s. They will be medical doctors, scientists, or engineers. Thus, these people most likely will be knowledgeable and well-read in the relevant literature and have the practical experience in molecular biology, recombination cloning, making artificial chromosomes, creating transgenic cells. Therefore, the level of ordinary skill in this art is high.

Considering objective evidence present in the application indicating obviousness or nonobviousness.

It would have been obvious to substitute the mammalian centromere sequence length of Mejia et al with a mammalian centromere sequence length of about 50kb or less as taught by Bokkelen et al with a reasonable chance of success because the simple substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. At the time of the invention, the ordinary artisan knew how to design specific lengths, composition, orientation and phasing of centromeric 171 base-pair alphoid DNA monomers to create arrays of specific lengths, e.g. 171 base-pairs to about 270kb. An artisan would be motivated to make a mammalian centromere sequence of about 50kb or less because alphoid DNA of larger sizes are difficult to clone and stably propagate because of the tendency of tandemly repetitive DNA to recombine into smaller arrays. Furthermore, the smaller length would provide more room in the artificial chromosome for the artisan to incorporate larger genes and/or regulatory elements.

Thus, the invention as a whole is *prima facie* obvious.

Response to Arguments

Applicant argues that Bokkelen et al do not cure the flaws of Mejia et al, Wayne et al, Ikono et al and Perkins et al.

Applicant's argument(s) has been fully considered, but is not persuasive. The Examiner's response to the arguments regarding the combination of Mejia et al, Wayne et al, Ikono et al and Perkins et al discussed above are incorporated herein. Applicant does not contest the teachings of Bokkelen et al as applied to the obviousness to substitute the mammalian centromere sequence length of Mejia et al with a mammalian centromere sequence length of about 50kb or less as

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taught be Bokkelen et al with a reasonable chance of success because the simple substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

8. **Claims 1 and 14 stand rejected under 35 U.S.C. 103(a)** as being unpatentable over Mejia et al (Genomics 70(2):165-170, 2000; *of record in IDS, AE), in further view of Waye et al (Mol. and Cell. Biol. 6(9):3156-3165, 1986), Ikeno et al (Human Mol. Gen. 3(8):1245-1257, 1994; *of record in IDS, CE), Perkins et al (US 2003/0119104 A1) and Bokkelen et al (U.S. Patent No. 5,695,967), as applied to claims 1, 4-7 and 13 above, and in further view of Cooke et al (WO 00/18941).

Determining the scope and contents of the prior art.

The prior cited art does not teach the ratio of the first vector to the second vector to be in the range from about 10:1 to about 1:10 molecular ratio. However, at the time of the invention, Cooke et al disclosed a method of making mammalian artificial chromosomes, wherein the first and second nucleic acids may be mixed extra-cellularly before co-introduction into a competent host cells wherein recombination cloning takes place, wherein the cells may be mammalian cells (pg 15, lines 1-20; pg 16, lines 15-20). Cooke et al disclosed formulating 1.3:1 ratio (pg 25, lines 18-19), as well as a 10:1 ratio (pg 29, line 20), of first vector to second vector.

Ascertaining the differences between the prior art and the claims at issue.

Cooke et al do not disclose the molecular ratio to be about 1:10; however, absent evidence to the contrary, nothing non-obvious is seen with this ratio because it is routine for the artisan to optimize relative ratios between the components of a cloning reaction so as to improve the yield of the desired reaction product.

Resolving the level of ordinary skill in the pertinent art.

People of the ordinary skill in the art will be highly educated individuals, possessing advanced degrees, including M.D.'s and Ph.D.'s. They will be medical doctors, scientists, or engineers. Thus, these people most likely will be knowledgeable and well-read in the relevant literature and have the practical experience in molecular biology, recombination cloning, making artificial chromosomes, creating transgenic cells. Therefore, the level of ordinary skill in this art is high.

Considering objective evidence present in the application indicating obviousness or nonobviousness.

It would have been obvious to one of ordinary skill in the art to try adjusting the molecular ratio of the first and second vector in a cloning reaction to be in the range from about 10:1 to about 1:10 molecular ratio because "a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipate success, it is likely that product not of innovation but of ordinary skill and common sense." Adjusting the relative ratios between a first (donor) nucleic acid and a second (target) nucleic acid in a molecular cloning reaction has long been practiced in the art. Furthermore, Cooke et al disclose

working examples wherein the first and second vectors are in molecular ratios between 1.3:1 and 10:1. An artisan would be motivated to formulate the molecular ratio of the first and second vector in a cloning reaction to be in the range from about 10:1 to about 1:10 so as to optimize the yield of the desired product artificial chromosome in the transformed cell.

Thus, the invention as a whole is *prima facie* obvious.

Response to Arguments

Applicant argues that Bakkelen et al do not cure the flaws of Mejia et al, Waye et al, Ikeno et al, Perkins et al and Bakkelen et al.

Applicant's argument(s) has been fully considered, but is not persuasive. The Examiner's response to the arguments regarding the combination of Mejia et al, Waye et al, Ikeno et al, Perkins et al and Bakkelen et al discussed above are incorporated herein. Applicant does not contest the teachings of Cooke et al as applied to the obviousness to try adjusting the molecular ratio of the first and second vector in a cloning reaction to be in the range from about 10:1 to about 1:10 molecular ratio because "a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipate success, it is likely that product not of innovation but of ordinary skill and common sense." Adjusting the relative ratios between a first (donor) nucleic acid and a second (target) nucleic acid in a molecular cloning reaction has long been practiced in the art.

Conclusion

9. No claims are allowed.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Kevin K. Hill, Ph.D. whose telephone number is 571-272-8036. The Examiner can normally be reached on Monday through Friday, between 9:00am-6:00pm EST.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Joseph T. Woitach can be reached on 571-272-0739. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kevin K. Hill, Ph.D./

Examiner, Art Unit 1633

/Q. JANICE LI, M.D./

Primary Examiner, Art Unit 1633